

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN THE APPLICATION OF:

DONALD BERNARD BIVENS ET. AL.

CASE NO.: FL1065 US NA

SERIAL NO.: 09/528,964

GROUP ART UNIT: 1751

FILED: MARCH 20, 2002

EXAMINER: HARDEE, JOHN R.

FOR: COMPOSITIONS OF DIFLUOROMETHANE, PENTAFLUOROETHANE, 1,1,1,2-TETRAFLUOROETHANE AND HYDROCARBONS

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TC 1700

**RESPONSE TO NON-FINAL OFFICE ACTION**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sirs:

This is Applicants' response to the Office Action, mailed on May 22, 2003 (identified as Paper No. 9) for which a three (3) month period for response was set. A Petition for an Extension of Time and Fee Transmittal Sheet are also enclosed. Applicants respectfully request reconsideration and submit the following in support thereof.

**RESPONSE**

The Examiner has rejected Claims 1, 2 and 4-6 under 35 U.S.C. 102(b) as being anticipated by JP 9-25480 (hereinafter "JP'480"), and under 35 U.S.C. 103(a) as being obvious in view of the same reference. The Examiner cites compositions disclosed by JP'480 at [0041], consisting of 5% of isobutane, 22-23% of R-125, 17-26% of R-32 and 47-55% of R-134a. The Examiner states that the vapor pressure properties are inherent, concluding that the disclosure of JP'480 sets forth all of the limits of the claims of the present invention. Applicants respectfully traverse the rejection.

Applicant respectfully submits that the compositions disclosed in JP'480 do not anticipate the compositions of the present invention. Claims 1, 2 and 4-6 recite compositions that are "azeotrope-like." The term "azeotrope-like" is defined in the specification at page 4, line 27, continuing to page 5, line 8. The disclosure of the JP'480 does not teach azeotrope-like compositions. Each and every element of Applicants' claimed invention is not disclosed in the reference. Withdrawal of the rejection is respectfully requested.

Applicants traverse the rejection of claims 1, 2 and 4-7 made under 35 U.S.C. 103(a) in view of JP'480. The present inventors understand the significance of using azeotrope-like compositions in refrigeration systems. Page 2, lines 19 through 26 of the present specification states "If the refrigerant is not a pure component or an azeotropic or azeotrope-like composition, the refrigerant composition may change when leaked or discharged to the atmosphere from the refrigeration apparatus, which may cause the refrigerant remaining in the equipment to become flammable or to exhibit unacceptable refrigeration performance. Accordingly, it is desirable to use as a refrigerant a single fluorinated hydrocarbon or an azeotropic or azeotrope-like composition which fractionates to a negligible degree upon leak from a refrigeration apparatus." (emphasis added). Applicants repeat this teaching at page 4, lines 15-26 of the specification. The recitations of claims 1, 2 and 4-7 require compositions that are azeotrope-like, and which comprise at least one hydrocarbon of the Markush group.

JP'480 does not disclose azeotrope-like compositions as refrigerants in vapor compression refrigeration and air conditioning apparatus. Further, JP'480 does not teach that the addition of a second hydrocarbon component (which can improve the characteristics of a refrigerant mixture), as is required by the present invention. Additionally, if one were to plot the compositions of Applicants' present claim 1 on the same plot as shown in JP'480 Figure 8, one would not arrive at the same composition ranges that are disclosed in JP'480 (as being acceptable replacements for R-22 in that they provide equal or better performance as a refrigerant). The disclosure of JP'480 does not in fact overlap the inventive compositions as defined in Claim 1. Applicants respectfully maintain that azeotrope-like compositions of the present invention are novel and non-obvious in view of JP'480.

The Examiner also rejects Claims 1-7 under 35 U.S.C. 103(a) as being unpatentable over WO 96/03473 A1 (hereinafter "WO'473"). WO'473 discloses refrigerant compositions containing difluoromethane (R-32) or 1,1,1-trifluoroethane (R-143a), pentafluoroethane (R-125), and at least one hydrocarbon. Additionally, the refrigerant compositions of WO'473 may contain an optional fourth component, that fourth component being 1,1,1,2-tetrafluoroethane or 1,1,2,2-tetrafluoroethane. WO'473 discloses that suitable hydrocarbons for the disclosed compositions are those containing from 2 to 6 carbon atoms. The reference specifically discloses that all of the compositions tested are non-azeotropic or zeotropic mixtures and, as a result, a slight compositional shift tends to arise on operation of the refrigeration or air conditioning system so that the composition, which circulates around the system, will not have exactly the same amounts of the constituent components as the composition which is actually charged to the system. In contrast, Applicants teach on page 4, line 23-26 a refrigerant "which fractionates to a negligible degree upon leak from a refrigeration apparatus." Clearly, WO'473 teaches away from the present invention and discloses only non-azeotropic refrigerant mixtures.

Applicants respectfully submit that the compositions of the present invention are non-obvious under 35 U.S.C. 103(a) over WO'473. The present inventors understand the significance of using azeotrope-like compositions in refrigeration systems as discussed above. The present invention is directed to specific compositions that even upon 50 percent or greater leakage, do not fractionate to become flammable.

It should be noted that compositions containing propane (disclosed by WO'473 as preferred) are flammable initially in the vapor phase and compositions containing n-pentane (disclosed by WO'473 as especially preferred) become flammable in the liquid and/or vapor phases as liquid is removed. There is no teaching in WO'473 as to how to produce a non-flammable composition that will remain non-flammable even in the event of a system leak. Applicants respectfully maintain that the present invention is non-obvious in view of WO'473.

**REMARKS**

In view of the foregoing, allowance of all pending claims is respectfully requested.

Respectfully submitted,



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Dated: November 21, 2003